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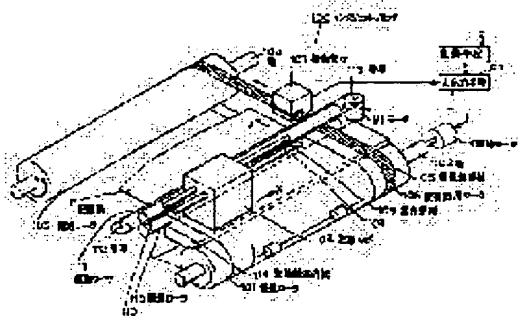
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(54) PRINT MEDIUM CARRIER AND PRINTER

(57)Abstract:

PROBLEM TO BE SOLVED: To realize a carrier for carrying a print medium accurately and a printer equipped with such a print medium carrier.

SOLUTION: In carrying a print medium P using a pulse motor M as a drive source, a control means C controls the carrying distance of the print medium based on a carrying distance determined based on an output pulse from an encoder 107 and a target value and a distance error smaller than the resolution of the encoder 107 is corrected by the number of pulses inputted to the pulse motor M.



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CLAIMS

[Claim(s)]

[Claim 1] A conveyance means to convey a print medium by the revolution member which rotates a pulse motor as a driving source, A quantization means to quantize the mileage between services per two or more steps of said pulse motor for the mileage between services of said print medium by said conveyance means as one unit, A measurement means to measure the mileage between services of said print medium based on the output signal of said quantization means, The control means which amends the mileage-between-services error of less than one unit of said quantization with the pulse number inputted into said pulse motor while controlling said conveyance means to make the mileage between services of said print medium in agreement with said desired value based on the measurement value and desired value by said measurement means, The print medium transport device characterized by providing.

[Claim 2] Said quantization means is a print medium transport device according to claim 1 characterized by what is been a thing using the band-like member which supports the repetition pattern of a binary signal and is conveyed by said print medium and coincidence with said conveyance means.

[Claim 3] Said quantization means is a print medium transport device according to claim 1 characterized by what is been a thing using the disc-like member which supports the repetition pattern of a binary signal and is rotated to said revolution member and coincidence.

[Claim 4] A conveyance means to convey a print medium by the revolution member which is the printer which prints on the print medium conveyed in fixed distance [every] stepping by the print head, and rotates a pulse motor as a driving source, A quantization means to quantize the mileage between services per two or more steps of said pulse motor for the mileage between services of said print medium by said conveyance means as one unit, A measurement means to measure the mileage between services of said print medium based on the output signal of said quantization means, The control means which amends the mileage-between-services error of less than one unit of said quantization with the pulse number inputted into said pulse motor while controlling said conveyance means to make the mileage between services of said print medium in agreement with said desired value based on the measurement value and desired value by said measurement means, The printer characterized by providing.

[Claim 5] Said quantization means is a printer according to claim 4 characterized by what is been a thing using the band-like member which supports the repetition pattern of a binary signal and is conveyed by said print medium and coincidence with said conveyance means.

[Claim 6] Said quantization means is a printer according to claim 4 characterized by what is been a thing using the disc-like member which supports the repetition pattern of a binary signal and is rotated to said revolution member and coincidence.

[Claim 7] Said print head is the printer of any one publication of claim 4 characterized by what is been what prints while moving in the conveyance direction of said print medium, and the crossing direction thru/or claim 6.

[Claim 8] Said print head is the printer of any one publication of claim 4 characterized by what is been the line head which covers the print range of a direction vertical to the conveyance direction of said print medium thru/or claim 6.

[Claim 9] Said print head is the printer of any one publication of claim 4 characterized by what is been a liquid discharge head thru/or claim 8.

[Claim 10] Said print head is the printer of any one publication of claim 4 characterized by what is been a thermal head thru/or claim 8.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the printer equipped with the print medium transport device and such a print medium transport device which convey a print medium in fixed distance [every] stepping about a print medium transport device and a printer.

[0002]

[Description of the Prior Art] For example, in an ink jet printer, a liquid, i.e., an ink droplet, is breathed out from a liquid discharge part, i.e., the nozzle of a print head, to print media, such as paper, and an image and an alphabetic character are printed (record). In a color-print, a print head has cyanogen, a Magenta, yellow, and an ink head about each of four primary colors of a clo, and is expressing the image of various colors etc. with the combination of the ink dot sprayed from each ink head. The consistency of the ink dot which constitutes an image etc. is 1000 [dozens -] and hundreds dpi extent. illustrating to which the pattern which the combination of the color of an ink dot and they form is supplied from a control device (computer) — it is specified with data.

[0003] Drawing 5 is the typical block diagram of the conventional example of an ink jet printer. Recording heads 3 and 3A are carried in carriage 2, and, as for this ink jet printer 1, recording heads 3 and 3A are connected with the control board 9 by the flexible cable 5. Recording heads 3 and 3A have the recording paper P and two or more nozzles which are not illustrated to the side which counters. Two or more nozzles are arranged along the direction of vertical scanning shown by the drawing Nakaya mark Y.

[0004] Carriage 2 reciprocates to the main scanning direction which drives with the carriage drive 6 and is shown by the drawing Nakaya mark X. The carriage drive 6 consists of devices containing motor 6a, pulley 6b, timing-belt 6c, and guide-rail 6d. Carriage 2 fixes to timing-belt 6c, and is driven through timing-belt 6c by motor 6a.

[0005] 8 is a paper conveyance device and conveys the recording paper P intermittently in the direction of vertical scanning shown by the arrow head Y. Intermittent mileage between services is equivalent to the width of face of the strip region which recording heads 3 and 3A record by one horizontal scanning. The paper conveyance device 8 consists of devices containing conveyance motor 8a and the conveyance rollers 8b and 8c. Conveyance roller 8b and conveyance roller 8c are driven by conveyance motor 8a through the interlock which is not illustrated, and conveyance roller 8c rotates them with a peripheral speed quicker very slightly than conveyance roller 8b.

[0006] The recording paper P is sent out from the feed section which is not illustrated, is pinched among conveyance roller 8b, and after being made to correct the sense of conveyance with the feed guide which is not illustrated, it is pinched and conveyed among conveyance roller 8c. Since the peripheral speed of conveyance roller 8c is very more slightly [than conveyance roller 8b] quick, the recording paper P is conveyed among the conveyance rollers 8b and 8c (i.e., record space), without generating slack.

[0007] Whenever, as for the detail paper P, carriage 2 performs horizontal scanning once, the above is conveyed fixed distance every in the direction of vertical scanning, and the alphabetic

character or image as an adhesion trace of an ink droplet breathed out from recording heads 3 and 3A is formed in the front face.

[0008]

[Problem(s) to be Solved by the Invention] In the above ink jet printers, an alphabetic character or an image (henceforth an image etc.) can be correctly recorded only after being able to send the recording paper P in the direction of vertical scanning fixed distance every at accuracy, but since the revolution nonuniformity of conveyance motor 8a is not avoided, nonuniformity arises in the mileage between services of the direction of vertical scanning of the recording paper P. Moreover, when a reduction gear etc. is prepared in the transfer system of driving force, the revolution nonuniformity by the backlash of a gearing system is not avoided, either. Moreover, when the rubber coat for the increment in friction with the detail paper P etc. is given to the front face of the conveyance rollers 8b and 8c, nonuniformity arises in mileage between services by the variation in roundness, surface irregularity, or distortion.

[0009] When the mileage between services of the recording paper P becomes larger than a predetermined distance by the nonuniformity of mileage between services As it goes too far beyond the original dot location which forms an image etc., for example, is shown in drawing 6 When the white omission P2 (it will be in the condition that the parts of an image etc. went out) occurs in the record image P1 and the mileage between services of the recording paper P becomes shorter than a predetermined distance at reverse For example, some images by the ink droplet overlapped, the concentration of an image etc. became deep selectively, and there was a problem of degrading the quality of the image which recorded on the recording paper P in any case.

[0010] Made in order that this invention might solve the above-mentioned trouble, the object is realizing the printer equipped with the print medium transport device and such a print medium transport device which convey a print medium to accuracy.

[0011]

[Means for Solving the Problem] (1) Invention of claim 1 for solving a technical problem A conveyance means to convey a print medium by the revolution member which rotates a pulse motor as a driving source, A quantization means to quantize the mileage between services per two or more steps of said pulse motor for the mileage between services of said print medium by said conveyance means as one unit, A measurement means to measure the mileage between services of said print medium based on the output signal of said quantization means, The control means which amends the mileage-between-services error of less than one unit of said quantization with the pulse number inputted into said pulse motor while controlling said conveyance means to make the mileage between services of said print medium in agreement with said desired value based on the measurement value and desired value by said measurement means, It is the print medium transport device characterized by providing.

[0012] In invention of claim 1, by the control means, the number of input pulses of a pulse motor amends the mileage-between-services error of less than one unit of quantization, and exact print medium conveyance is performed.

[0013] (2) Invention of claim 2 for solving a technical problem is a print medium transport device according to claim 1 characterized by what is been a thing using the band-like member which said quantization means supports the repetition pattern of a binary signal, and is conveyed by said print medium and coincidence with said conveyance means.

[0014] In invention of claim 2, a quantization means quantizes mileage between services using the band-like member which supports the repetition pattern of a binary signal and is conveyed by a print medium and coincidence.

(3) Invention of claim 3 for solving a technical problem is a print medium transport device according to claim 1 characterized by what is been a thing using the disc-like member which said quantization means supports the repetition pattern of a binary signal, and is rotated to said revolution member and coincidence.

[0015] A quantization means supports the repetition pattern of a binary signal with invention of claim 3, and quantizes mileage between services by it using the revolution member for print medium conveyance, and the disc-like member rotated to coincidence.

[0016] (4) Invention of claim 4 for solving a technical problem A conveyance means to convey a print medium by the revolution member which is the printer which prints on the print medium conveyed in fixed distance [every] stepping by the print head, and rotates a pulse motor as a driving source, A quantization means to quantize the mileage between services per two or more steps of said pulse motor for the mileage between services of said print medium by said conveyance means as one unit, A measurement means to measure the mileage between services of said print medium based on the output signal of said quantization means, The control means which amends the mileage-between-services error of less than one unit of said quantization with the pulse number inputted into said pulse motor while controlling said conveyance means to make the mileage between services of said print medium in agreement with said desired value based on the measurement value and desired value by said measurement means, It is the printer characterized by providing.

[0017] In invention of claim 4, by the control means, the number of input pulses of a pulse motor amends the mileage-between-services error of less than one unit of quantization, and exact print medium conveyance is performed.

[0018] (5) Invention of claim 5 for solving a technical problem is a printer according to claim 4 characterized by what is been a thing using the band-like member which said quantization means supports the repetition pattern of a binary signal, and is conveyed by said print medium and coincidence with said conveyance means.

[0019] In invention of claim 5, a quantization means quantizes mileage between services using the band-like member which supports the repetition pattern of a binary signal and is conveyed by a print medium and coincidence.

(6) Invention of claim 6 for solving a technical problem is a printer according to claim 4 characterized by what is been a thing using the disc-like member which said quantization means supports the repetition pattern of a binary signal, and is rotated to said revolution member and coincidence.

[0020] A quantization means supports the repetition pattern of a binary signal with invention of claim 6, and quantizes mileage between services by it using the revolution member for print medium conveyance, and the disc-like member rotated to coincidence.

[0021] (7) Invention of claim 7 for solving a technical problem is the printer of any one publication of claim 4 characterized by what is been what prints while said print head moves in the conveyance direction of said print medium, and the crossing direction thru/or claim 6.

[0022] In invention of claim 7, while a print head moves in the conveyance direction of a print medium, and the crossing direction, it prints.

(8) Invention of claim 8 for solving a technical problem is the printer of any one publication of claim 4 characterized by what said print head is a line head which covers the print range of a direction vertical to the conveyance direction of said print medium thru/or claim 6.

[0023] In invention of claim 8, a print head prints the print range of a direction vertical to the conveyance direction of a print medium at once.

(9) Invention of claim 9 for solving a technical problem is the printer of any one publication of claim 4 characterized by what said print head is a liquid discharge head thru/or claim 8.

[0024] In invention of claim 9, a print head prints by the liquid regurgitation.

(10) Invention of claim 10 for solving a technical problem is the printer of any one publication of claim 4 characterized by what said print head is a thermal head thru/or claim 8.

[0025] In invention of claim 10, a print head prints by the thermal method.

[0026]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to a drawing. In addition, this invention is not limited to the gestalt of operation. Moreover, although the example whose print medium is paper explains, a print medium is not restricted to paper and contains cloth, a nonwoven fabric, a plastic film, and all the other media that can support the recorded visible image.

[0027] The typical configuration of an ink jet printer 100 is shown in drawing 1 . This equipment is an example of the gestalt of operation of the printer of this invention. As shown in drawing 1 , with this equipment, the conveyance roller 101,103 which is the conveyance member of the

recording paper P which records an image etc. has a shaft 102,104, and is supported free [a revolution] by the support means which is not illustrated, respectively. The recording paper P is an example of the gestalt of operation of the print medium in this invention.

[0028] Drive-motor M for rotating the conveyance roller 101 and conveying the recording paper P is connected with the shaft 102 of the conveyance roller 101. Drive-motor M is a pulse motor. The recording paper P to which paper was fed from the feed section which is not illustrated is twined round [some conveyance rollers 101], and it conveys in the direction of vertical scanning shown by the drawing Nakaya mark Y. The part which consists of a conveyance roller 101,103 and drive-motor M is an example of the gestalt of operation of the conveyance means in this invention. The conveyance roller 101 is an example of the gestalt of operation of the revolution member in this invention.

[0029] 108 is a recording head, and to the direction of vertical scanning of the recording paper P, it is constructed across by the advice member 109 so that it may be movable to a right-angled main scanning direction (the direction of the drawing Nakaya mark X). A recording head 108 is an example of the gestalt of operation of the print head in this invention. Moreover, it is an example of the gestalt of operation of the liquid discharge head in this invention. In order to carry out both-way migration of the recording head 108 by the width of face of the recording paper P, a recording head 108 is fixed to some actuation wires 111 which carried out suspension to the block 112,113, a block 113 is connected with a motor M1, and a recording head 108 is driven through the actuation wire 111 by the motor M1.

[0030] The configuration of a recording head 108 makes an ink droplet breathe out from a delivery according to the picture signal which establishes two or more deliveries (nozzle) which carry out the regurgitation of the ink droplet, and which are not illustrated in the underside in drawing of the recording paper P and the recording head 108 which counters, and is given to it from the signal feed zone which is not illustrated, and forms an image etc. on the recording paper P.

[0031] Two or more nozzles of a recording head 108 are arranged along the direction of vertical scanning. The pitch of 64 pieces and an array of the number of a nozzle is for example, 360dpi. Record about the strip region which has width of face of 4.5mm in the direction of vertical scanning by one horizontal scanning of a recording head 108 is performed by this.

[0032] Between the conveyance roller 101 and the conveyance roller 103, the detected member 105 constituted in the shape of a belt is hung about along the conveyance direction of vertical scanning, i.e., direction, of the recording paper P with a PET film etc. Thereby, the detected member 105 is the same rate as the passing speed of the recording paper P, and moves in parallel to the same direction. That is, migration of the detected member 105 expresses conveyance of the recording paper P. The detected member 105 is an example of the gestalt of operation of the band-like member in this invention.

[0033] The mark 106 for [detected] is formed in the detected member 105 covering the overall length of the detected member 105. The mark 106 for [detected] serves as a disk pattern whose duty ratio formed considering the pitch equivalent to for example, 360dpi as one period is 50%.

[0034] A part of detected member 105 is approached, the detection member 107 of immobilization of a location is arranged, and the mark 106 for [detected] on the detection member 105 is detected. The part which consists of the detected member 105, a mark 106 for [detected], and a detection member 107 is an example of the gestalt of operation of the quantization means in this invention.

[0035] C is a control means, it incorporates the output signal of the detection member 107 through the I/O means C1, controls a motor M1 and drive-motor M through the I/O means C1 based on it, and performs horizontal scanning of a recording head 108, and vertical scanning of the recording paper P, respectively. Thereby, whenever a recording head 108 performs horizontal scanning once, the recording paper P is conveyed intermittently every 4.5mm. A control means C is an example of the gestalt of operation of the measurement means in this invention. Moreover, it is an example of the gestalt of operation of the control means in this invention.

[0036] Face to face is stood against a recording head 108, the detail-paper-guide plate 114 is

formed, and the bow of the recording paper P under a recording head 108 is prevented by guiding the recording paper P now. Delivery conveyance of the recording paper P is carried out outside with one pair of conveyance rollers 110. The conveyance roller 110 is driven by the driving source which is not illustrated.

[0037] The detection member 107 is used for drawing 2 (a) and (b), and the example of a gestalt of the operation which detects the mark 106 of the detected member 105 for [detected] is shown. In drawing 2 (a), light-emitting part 107A and photo detector 107B are prepared by the predetermined angular relation-ship in the detection member 107, the light of light-emitting part 107A is reflected by the detected member 105, and incidence is carried out to photo detector 107B. The reflected light which carries out incidence to photo detector 107B is modulated by the existence of the mark 106 for [detected] in a light reflex point in binary along with migration of the detected member 105, and the pulse signal based on it is inputted into the I/O means C1 from photo detector 107B.

[0038] In drawing 2 (b), light-emitting part 107A and photo detector 107B are arranged face to face on both sides of the detected member 105. The incident light of photo detector 107B is modulated in binary along with migration of the detected member 105 according to the existence of the mark 106 for [detected] in a light transmission point, and the pulse signal based on it is inputted into the I/O means C1 from photo detector 107B.

[0039] The detection member 107 produces a pulse train signal (encoder pulse) as shown in (a) of drawing 3 by migration of the detected member 105 in accordance with conveyance of the recording paper P. An encoder pulse becomes that by which one period is equivalent to 360dpi corresponding to the disk pattern which is the mark 106 for [detected], and a duty ratio becomes 50%. Spacing (edge spacing) of the rising edge of an encoder pulse and a falling edge is equivalent to the distance of 35 micrometers (accuracy 35.2777 micrometers) with this. That is, mileage between services is quantized every 35 micrometers.

[0040] A control means C carries out counting of the number of edges of an encoder pulse, recognizes the mileage between services of the recording paper P, and it controls it so that the mileage between services per time of the direction of vertical scanning is set to 4.5mm based on it. Since the mileage between services of 4.5mm is equivalent to a part for 128 edges in an encoder pulse, if the enumerated data of the encoder pulse edge after conveyance initiation convey the recording paper P continuously between less than 128 and a control means C amounts to 128, it will stop conveyance.

[0041] Conveyance of the recording paper P is performed by giving a driving pulse to drive-motor M which is a pulse motor. The conveyance system which consists of drive-motor M and a conveyance roller 101 produces the mileage between services of 35 micrometers for example, by 24 pulses. The relation between the driving pulse at this time and an encoder pulse comes to be shown in (b) of drawing 3, and it corresponds to the driving pulse whose edge spacing of an encoder pulse is 24 pieces. 4.5mm conveyance which is equivalent to 128 edges of an encoder pulse with this is performed by 3072 driving pulses. This becomes conveyance of 1.46 micrometers per 1 driving pulse.

[0042] As mentioned above, since the mileage between services of the recording paper P is controlled based on the encoder pulse detected from the detected member 105 conveyed together with the recording paper P, conveyance to the direction of vertical scanning of the recording paper P is performed to accuracy. Therefore, a white omission like before etc. does not occur in the recorded image, but a quality image etc. can be obtained.

[0043] By the way, in the site of a actual activity of this equipment, by the variation in the thickness of the detail paper P etc., the thickness of the detail paper P and the thickness of the detected member 105 may not be in agreement with accuracy, and, in such a case, an error arises between the mileage between services found from the encoder pulse, and the actual mileage between services of the detail paper P.

[0044] Supposing there is 0.3% of such errors, for example, per mileage between services of 4.5mm, it will become a 13.5-micrometer mileage-between-services error. Although a possibility of causing quality degradation of the recorded image has such a mileage-between-services error, since this range error is smaller than 35 micrometers of quantization units of an encoder pulse, it

is undetectable using an encoder pulse.

[0045] So, in such a case, according to the difference of the mileage between services of the actual recording paper P measured beforehand, and the nominal mileage between services which can be found from an encoder pulse, the number of driving pulses per [which is given to drive-motor M] vertical scanning is adjusted.

[0046] Hereafter, amendment of a mileage-between-services error is explained. Suppose that the detail paper P was continuously conveyed while the control means C carried out counting of the encoder pulse, and nominal mileage between services (4.5mm) was conveyed with enumerated data having reached a part for 128 edges. However, supposing there is -0.3% of mileage-between-services errors, for example, only 13.5 micrometers of actual mileage between services are shorter than a target distance. Then, a control means C gives an additional driving pulse to nine pieces and drive-motor M, in order to convey 13.5 more micrometers. Only 13.5 micrometers is additionally conveyed by this, an error is amended, and it comes to be in agreement with target mileage between services.

[0047] In addition, only 13.5 micrometers of relative positions of the mark 106 for [detected] to the detection member 107 shift by such distance error correction at this time. And next conveyance is started from this condition.

[0048] Since the mileage between services for 128 edges is shorter than target distance 13.5 micrometers as mentioned above although it is carried out until the measurement value of an encoder pulse reaches a part for 128 edges also in conveyance of the following time, and it generates in mileage between services only with 13.5 micrometers short [the first edge] further for a gap of the starting point of conveyance of this time, mileage between services is shorter than desired value 27 micrometers after all. Then, a control means C inputs 18 driving pulses into drive-motor M additionally, in order to convey 27 more micrometers, and it makes the mileage between services of the recording paper P in agreement with desired value.

[0049] The pulse for error correction which carried out sequential accumulation nine pieces at a time is added similarly hereafter, and the mileage-between-services error in vertical scanning of each time is amended. In addition, since the one section of an encoder pulse edge is equivalent to 24 pulses, whenever accumulated exceeds 24, it is reduced every [24], and performs processing accumulated every [9] about the remainder. Thus, since very exact vertical scanning is performed by amending the mileage-between-services error of under the quantization unit of an encoder pulse, the print object of high quality can be obtained extremely.

[0050] Although the detected member 105 which formed two or more marks 106 for [detected] in the conveyance roller 101 which conveys the recording paper P is hung about and he is trying to detect the mark 106 of the detected member 105 for [detected] by the detection member 107 in the example of a gestalt of the above operation For example, the mark of fixed spacing corresponding to the mark 106 for [detected] is prepared in the cylinder side or cylinder end face of a part which does not convey the recording paper P of conveyance roller 101**, the mark is detected by the detection member 107, and you may make it control drive-motor M by the control means C based on it.

[0051] The typical configuration of the ink jet printer 100 which adopted such technique as drawing 4 is shown. This ink jet printer 100 is an example of the gestalt of operation of the printer of this invention. In this equipment, the same sign is given to the same part as the equipment shown in drawing 1 . As shown in this drawing, in order to convey the recording paper P, the conveyance roller 101 which is a cylinder-like conveyance member is formed in the ink jet printer 100 free [a revolution] .

[0052] Since a gearing G1 is fixed and formed in a shaft 102 in order to make the shaft 102 of the conveyance roller 101 rotate the conveyance roller 101 and to convey the recording paper P, and a gearing G1 is driven, the driver G prepared in the drive motor M2 which is a driving means has been engaged on the gearing G1. From the feed section which is not illustrated, feed paper to the recording paper P, some conveyance rollers 101 are made to contact, and the recording paper P is conveyed. Namely, the recording paper P is conveyed in the direction of vertical scanning. The part which consists of the conveyance roller 101, a gearing G1, a driver G, and a drive motor M2 is an example of the gestalt of operation of the conveyance means in this

invention.

[0053] He fixes and forms the disc-like detected member 115 which formed two or more slits 116 for [detected] in accordance with the periphery in the shaft 102 of the conveyance roller 101, and is trying to rotate it with the conveyance roller 101. The detected member 115 is an example of the gestalt of operation of the disc-like member in this invention. The detection member 117 which detects the slit 116 for [detected] approaches, and is prepared in the detected member 115. Although the slit 116 for [detected] is formed in the pitch of for example, 360dpi, drawing 4 only shows it typically. The relation between the detected member 115 and the detection member 117 is the same as that of what was shown in drawing 2 (a) and (b). The part which consists of a detected member 115 and a detection member 117 is an example of the gestalt of operation of the quantization means in this invention.

[0054] 108 is a recording head, and it is constructed across on the advice member 109 so that it can move to a right-angled main scanning direction to the feed direction of the recording paper P. A recording head 108 is fixed to some actuation wires 111 hung about on the block 112,113, a block 113 is connected with a motor M1, and both-way migration of the recording head 108 is carried out through the actuation wire 111 by actuation by the motor M1 so that the both-way migration of the recording head 108 can be carried out by the width of face of the recording paper P. The configuration of a recording head 108 is the same as that of the recording head 108 in drawing 1.

[0055] C is a control means, considers the detection signal of the detection member 117 as an input through the I/O means C1, and performs control of a drive motor M2 and a motor M1 based on it. Face to face is stood against a recording head 108, the detail-paper-guide plate 114 is formed, and the bow of the recording paper P under a recording head 108 is prevented. Paper is delivered outside to the recording paper P with one pair of conveyance rollers 110.

[0056] In this equipment, the detected member 115 and the detection member 117 are used for measurement of the mileage between services of nothing and the direction of vertical scanning of the recording paper P in an operation equivalent to the detected member 105 and the detection member 107 in the equipment shown in drawing 1. And record of an image etc. is performed in high quality by the same transfer control and error correction as the equipment shown in drawing 1 based on it.

[0057] Although it is the example which prints by the above moving a recording head 108 to a main scanning direction, the recording head 108 of it being good also as a line head which has the magnitude which covers all the range of a main scanning direction, and prints the range at once is natural.

[0058] Moreover, a recording head 108 is not restricted to the above liquid discharge heads, and it cannot be overemphasized that you may be what records by other methods, such as a thermal head, an optical head, or an impact head.

[0059] Moreover, although the example whose mark for [detected] is an optical mark was shown, it may not restrict to it and you may be the mark of other formats, such as a magnetic mark.

[0060]

[Effect of the Invention] As explained to the detail above, since the number of input pulses of a pulse motor amends the mileage-between-services error of less than one unit of quantization and it was made to perform exact print medium conveyance by the control means, by invention of claim 1, the print medium transport device which conveys a print medium to accuracy is realizable.

[0061] Moreover, in invention of claim 2, since mileage between services was quantized using the band-like member which supports the repetition pattern of a binary signal and is conveyed by a print medium and coincidence with a quantization means, print medium mileage between services is measurable to accuracy.

[0062] Moreover, in invention of claim 3, since mileage between services was quantized with the quantization means using the disc-like member which supports the repetition pattern of a binary signal and is rotated to the revolution member and coincidence for print medium conveyance, print medium mileage between services is measurable to accuracy.

[0063] Moreover, in invention of claim 4, since the number of input pulses of a pulse motor amends the mileage-between-services error of less than one unit of quantization and it was made to perform exact print medium conveyance by the control means, the printer which conveys a print medium to accuracy and prints high quality is realizable.

[0064] moreover, in invention of claim 5, since the quantization means carried out for supporting the repetition pattern of a binary signal and being able to quantize mileage between services using a print medium, simultaneously the band-like member conveyed, print medium mileage between services is measurable to accuracy.

[0065] Moreover, in invention of claim 6, since mileage between services was quantized with the quantization means using the disc-like member which supports the repetition pattern of a binary signal and is rotated to the revolution member and coincidence for print medium conveyance, print medium mileage between services is measurable to accuracy.

[0066] Moreover, in invention of claim 7, the printer which is made to move a print head in the conveyance direction of a print medium and the crossing direction, and prints high quality is realizable.

[0067] Moreover, in invention of claim 8, the printer which prints the print range of a direction vertical to the conveyance direction of a print medium at once, and prints high quality with a line head is realizable.

[0068] Moreover, in invention of claim 9, the printer which prints high quality by the liquid regurgitation is realizable. Moreover, in invention of claim 10, the printer which prints high quality by the thermal method is realizable.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the typical block diagram of the equipment of an example of the gestalt of operation of this invention.

[Drawing 2] It is the mimetic diagram showing the relation of the detection member and the detected member in the equipment of an example of the gestalt of operation of this invention.

[Drawing 3] It is the wave form chart of the detection signal of the detection member in the equipment of an example of the gestalt of operation of this invention.

[Drawing 4] It is the typical block diagram of the equipment of an example of the gestalt of operation of this invention.

[Drawing 5] It is the typical block diagram of an example of equipment conventionally.

[Drawing 6] It is the conceptual diagram of a print with an example of equipment conventionally.

[Description of Notations]

P Recording paper

M Drive motor

101 Conveyance Roller

105 Detected Member

106 Mark for [Detected]

107 Detection Member

108 Recording Head

C1 I/O means

C Control means

[Translation done.]